REMARKS

Entry of the foregoing amendment and reconsideration of the application, pursuant to and consistent with the Rules of Practice in Patent Cases, in light of the remarks which follow, is respectfully requested. Upon entry of the amendment, new claims 32-34 have been added so that claims 1-34 will be pending.

Claims 1-31, now represented by claims 1-34, stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,356,951 to Yearn et al. ("Yearn") in view of WO 00/61703 to Blackwell et al. ("Blackwell"), DE 3502594 A1 to Michl et al. ("Michl"), U.S. Patent No. 4,503,169 to Randklev ("Randklev"), and U.S. Patent No. 4,668,712 to Hino et al. ("Hino"). This rejection is respectfully traversed.

The present invention provides polymerizable compositions with low polymerization shrinkage, transparency and polishability. The compositions achieve these desired characteristics through the use of a new filler based on a particulate composite material. As required by independent claims 1 and 10, the particulate composite material has an average particle size of 20 to 50 μm, and contains at most 10 wt.-% of particles having a grain size of less than 10 μm. As used herein, "composite material" refers to a material on the basis of a polymerizable organic binder and inorganic fillers (see, for example, page 4, last paragraph to page 5, first paragraph, of the present specification).

As described in the present specification, a suitable particulate composite material can be prepared, for example, by mixing an organic binder and filler, and optionally, a polymerization initiator, curing, and then grinding the mixture (page 5, last paragraph). As is known in the art, during normal grinding of a composite material, a considerable amount of fine particulate material (i.e., having a particle size of < 10 μm) is formed (page 6, second paragraph). Example 1 and Figure 1 of the present specification show, for example, that grinding of such a composite material to an average particle size of 21 μm resulted in the formation of particles having a size of less than 10 μm in a proportion of about 40 percent.

Applicants have surprisingly found that removing this fine particulate material (i.e., by restricting the amount of particles having a grain size of less than 10 μm to 10 wt.-% or less), can reduce the degree of polymerization shrinkage of the composition. Examples 2

and 3, for example, show that the polymerization shrinkage of a polymerizable composition was reduced from 1.9% to 1.6% by removing the fine particulate material.

Yearn describes a composition for dental restoration materials, which includes a methacrylate or acrylate monomer, a specific composite filler, a specific glass powder component having a specific particle diameter, a fine particle filler having a specific particle diameter, and a photopolymerization initiator (Abstract). The composite filler is obtained by curing and pulverizing a mixture of glass powders having a maximum particle diameter of 10 μm or less and a mean particle diameter of 0.1 to 5μm with a methacrylate or acrylate monomer having at least one unsaturated double bond (col. 3, lines 44 to 51). The composite filler is said to have a mean particle diameter of 5 to 50 μm, although it is noted that the largest composite filler particles prepared in the examples have a mean particle size of only 15 μm (col. 5, lines 57 to 58).

Because Yearn utilizes pulverization in the preparation of the composite filler, it is apparent to the person of skill in the art that the filler must contain a significant amount of fine particulate material (i.e., particles < 10 mm). However, nothing in Yearn discusses this material, nor recognizes its potential effect on the properties of the ultimate dental restorative material. In fact, in direct contrast to the principles of the present invention, Yearn teaches directly away from minimizing the presence of fine particulate material in the composite filler, by explicitly requiring two additional very small particulate components: a specific glass powder component having a mean particle diameter of 0.1 to 5 μm, and a fine particle filler having a mean particle diameter of 0.01 to 0.04μm. Moreover, Yearn associates several disadvantages of prior art dental restorative materials with a filler material having a large mean particle size. Yearn states, for example, that "[T]he filler used so far for dental composite resin restorative material is glass powders having a maximum particle diameter of 10 to 50μm. However, the composite resin incorporating such a large particle-diameter filler (i.e., 10 to 50μm) fails clinically to give any smoothly finished surface..." (col. 1, lines 15-21). More importantly, Yearn states that, "[the failings of the prior art are] attained by the provision of a composition for dental restorative materials which comprises a novel combination of an organic/inorganic composite filler, a glass powder component, and a fine filler." (paragraph bridging col. 1 to col. 2). Clearly, the teaching gleaned from Yearn is the combination of specifically sized particulate filler components, of which a very significant

portion have a mean particle size less than 10 µm (glass powder component: 0.1 to 5 µm; fine filler 0.01 to 0.04µm).

The Office cites Blackwell as suggesting the modification of Yearn to achieve the claimed composite material, which requires an average particle size of 20 to 50 µm and at most 10 wt.-% particles with a size of < 10µm.

Similar to Yearn, however, Blackwell describes polymerizable compositions that include filler combinations with a certain defined size distribution and size relationship (page 3, last paragraph). According to the teachings of Blackwell, a conventional composite paste formulation comprising about 75-80 wt.-% filler having a particle size distribution of about 0.01 to 0.1 microns, is mixed with an additional fraction of a coarse filler, which is chosen on the basis that its mean particle size is at least about 20 times the size of the largest particle in the first filler (page 4, lines 1-7 and 15-17). Thus, the teaching of Blackwell is directed to the addition of a fraction of coarse filler to a composition having an existing high concentration of a fine particulate filler. Again, similar to Yearn, it is the specific combination of a high concentration fine particle filler with a fraction of coarse filler that provides the benefits claimed by Blackwell.

Thus, the teachings of both references are clearly in direct contrast to the principles of the present invention, which relies on removal of fine particulate filler material. In contrast to both Yearn and Blackwell, the present invention is directed to a particulate composite material having "an average particle size of 20 to 50 µm" and only a trace amount of fine particles ("at most 10 wt.-% particles with a size of < 10 µm"). Because the compositions of both Yearn and Blackwell explicitly require a significant amount of fine particles, neither reference can be said to recognize the benefit obtained by removing fine particles from the composite, such that it contains "at most 10 wt.-% particles with a size of < 10 µm".

Thus, even if one were to combine the teachings of Yearn and Blackwell, the claimed invention is not achieved. The other secondary references cited by the Office, are said to disclose various dependent features of applicants' claims, and none of the references teaches, suggests, or recognizes the benefit to be obtained by reducing the proportion of fine-particulate material in a composite material. Accordingly, as none of the cited art, alone, or

in combination, discloses the claimed invention, withdrawal of the record rejection of claims 1-34 under Yearn in view of Blackwell, Michl, Randklev, and Hino is respectfully requested.

In view of all of the foregoing, applicants submit that this case is in condition for allowance and such allowance is earnestly solicited.

Respectfully submitted,

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